REMARKS/ARGUMENTS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1, 3, 4, 6-13, 15, 16 and 18-21 are pending in the present application. Claims 1, 13, 15 and 21 are amended and Claims 2 and 17 are canceled by the present amendment. Support for amendments to the claims can be found, at least, in Claims 2 and 7 as originally filed and in page 8, lines 21-23, page 11, lines 12-14 and page 22, lines 6-13. Thus, no new matter is added.

In the outstanding Action, Claims 1-3, 6, 10-12, 13-15, 20 and 21 were rejected under 35 U.S.C. §103(a) as unpatentable over Kaplan et al. (U.S. Patent No. 6,270,921 B1 herein referred to as "Kaplan") in view of Okazaki et al. (JP401059782A herein referred to as "Okazaki"), Porter et al. (U.S. Pat. No. 3,840,404, herein "Porter"), Espig et al. (GB 1256419, herein "Espig"), Abraham et al. (J. Electrochem. Soc., Vol. 143, No. 1, January 1996; herein "Abraham"), and Norio et al. (JP 10-083836, herein "Norio") as evidenced by Tekeuchi et al. (U.S. Pat. Pub. No. 2003/0047809, herein "Tekeuchi"), Golvin et al. (U.S. Pat. No. 5,733,677, herein "Golvin"), Hatakeyama et al. (U.S. Pat. No. 6,063,503, herein "Hatakeyama") and Hoyt et al. (U.S. Pat. No. 5,445,884, herein "Hoyt"); Claims 4 and 19 were rejected under 35 U.S.C. §103(a) as unpatentable over Kaplan in view of Okazaki, Porter, Espig, Abraham, Norio, Tekuchi, Golvin, Hatakeyama and Hoyt in further in view of Arao et al. (WO 2063703 A1 herein referred to as "Arao") evidenced by Rosato et al. (Injection molding Handbook; 3rd Edition; Rosato, Dominick V.; Rosato, Donald V.; M.G.; 2000; Springer-Verlag, herein referred to as "Rosato"); Claim 7 was rejected under 35 U.S.C. §103(a) as unpatentable over Kaplan in view of Okazaki, Porter, Espig, Abraham, Norio, Tekuchi, Golvin, Hatakeyama and Hoyt in further in view of Kelsey et al. (U.S. 2002/0132161 A1 herein referred to as "Kelsey"); Claims 8-9 were rejected under 35 U.S.C.

§103(a) as unpatentable over Kaplan in view of Okazaki, Porter, Espig, Abraham, Norio, Tekuchi, Golvin, Hatakeyama and Hoyt in further in view of Yoshino et al. (JP02060052A herein referred to as "Yoshino"); and Claims 16-18 were rejected under 35 U.S.C. §103(a) as unpatentable over Kaplan in view of Okazaki, Porter, Espig, Abraham, Norio, Tekuchi, Golvin, Hatakeyama and Hoyt in further in view of Tinker (U.S. Patent No. 5,506,067).

With regard to the rejection of Claim 21 under 35 U.S.C. §112, second paragraph, as indefinite, Applicants respectfully submit that Claim 21 has been amended to overcome the rejection. Accordingly, Applicants respectfully request that the rejection of Claim 21 under 35 U.S.C. §112, second paragraph, be withdrawn.

With regard to the objection to Claim 13 under 37 C.F.R. §1.75(C) as being of improper dependent form for failing to further limit the subject matter of a previous claim, Claim 13 has been amended to overcome the objection. Accordingly, Applicants respectfully request that the objection to Claim 13 be withdrawn.

Before turning to the outstanding art rejections it is believed that a brief review of the features of the claimed invention would be helpful.

In this regard, the claimed invention recites that air is taken into a battery container through air pores of the battery container. However, since the barrier film is non-porous, the rate at which oxygen is supplied through a barrier film to an air positive electrode is higher than the rate at which the air in the battery container is consumed by discharge. Therefore, as the discharge progresses, the pressure in the battery container becomes negative.[1]

Since a negative electrode sheet that includes a negative electrode active material which intercalates and deintercalates lithium ions is used, an active material is consumed

[1] See page 8, lines 1-5 and page 14, lines 10-13 of the present disclosure.

sequentially from the surface of a negative electrode sheet by battery reaction.[2] As a result, the volume of the negative electrode sheet decreases as the discharge reaction progresses.

In addition, the claimed invention recites that the battery container is formed of a laminate film. Thus, when the pressure in the battery container becomes negative, the battery container is deformed in such a manner that the capacity of the battery container is reduced and the surface of the electrode group is pressurized. Consequently, even if the volume of the negative electrode sheet decreases by discharge, a gap is not formed between the negative electrode sheet and the separator and it is possible to maintain contact among the negative electrode sheet, separator and air positive electrode.[3]

Further, the claimed invention recites that the pressure in the battery container at the time of continuous discharge is lower than the atmosphere pressure by 0.1 to 80 kPa. As a result, sufficiently tight contact can be maintained and a high discharge capacity can be maintained.[4]

Addressing now the rejection of Claims 1-3, 6, 10-12, 13-15, 20 and 21 under 35 U.S.C. §103(a) as unpatentable over Kaplan in view of Okazaki, Porter, Espig, Abraham, Norio, Tekuchi, Golvin, Hatakeyama and Hoyt, this rejection is respectfully traversed.

Amended Claim 1 recites,

> An air battery comprising:
> a battery container made of a laminate film and having a surface in which air pores are formed;
> an electrode group provided in the battery container and including an air positive electrode, a negative electrode sheet containing a negative electrode containing a negative electrode active material which intercalates and deintercalates lithium ions, and a separator provided between the air positive electrode and the negative electrode;
> a nonaqueous electrolyte; and
> a laminated sheet including a barrier film which is provided between the surface of the battery container and the

[2] See page 7, lines 6-11 of the present disclosure.
[3] See page 8, lines 1-8 and page 14, line 21 to page 15, line 1 of the present disclosure.
[4] See page 8, lines 9-20 and page 14, line 21 to page 15, line 5 of the present disclosure.

> air positive electrode of the electrode group, and of which oxygen permeation coefficient is 1 x 10^{-14} mol·m/m^2·sec·Pa or less, the barrier film being formed of thermoplastic resins, being non-porous, and having a thickness of 2 to 100 μm, and a gap holding member which is laminated on the barrier film and is opposite to the air positive electrode, and the gap holding member comprising at least one selected from the group consisting of a porous film, a nonwoven fabric, and a woven fabric,
>
> wherein the air pores of the battery container are closed by the laminated sheet, and an internal pressure in the battery container during continuous discharge is lower than an atmospheric pressure by 0.1 to 80 kPa.

Amended Claim 15 recites similar features with regard to the barrier film.

Kaplan describes a prismatic air recovery battery.[5] Kaplan further describes that the battery can include a cathode having at least one air access opening having a central longitudinal axis, wherein the cathode includes a major surface normal to the longitudinal axis of the opening.[6]

Kaplan, however, does not describe or suggest the barrier film being formed of thermoplastic resins and having a thickness of 2 to 100 μm, as is recited in amended Claim 1.

Page 5 of the outstanding Office Action states that "Takeuchi evidences that polytetrafluoroethylene is a thermoplastic resin ([0027], lines 21-22)."

However, Applicants note that although Takeuchi states that "polytetrafluoroethylene is a thermoplastic resin" this statement is simply incorrect as polytetrafluoroethylene cannot properly be asserted as being a thermoplastic resin.

For instance, evidence of this fact is provided by portions of *Iwanami Physical and Chemical Dictionary* (fourth edition), which describes 'thermoplasticity", "thermoplastic resin" and "fluorocarbon polymers" (please find attached as attachment 1) and the web page (http://www.hkpgmbh.de/daikin/daikin/products/ptfe/ptfe.html) of Daikin Chemical Europe GmbH, a copy of which is also attached as attachment 2.

[5] see Kaplan, Abstract.
[6] Id.

Specifically, these authoritative references define a thermoplastic resin as "a synthetic resin which exhibits, when heated, a thermoplasticity to such a degree that it can be molded."[7] Further, thermoplasticity is defined as "property of material in which it becomes deformable when heated and reversibly cures when cooled."[8] Therefore, whether or not the resin has a thermoplasticity has nothing to do with whether or not the resin has a melting point.

Even so, in many cases, polytetrafluoroethylene does not have a melting point. Even when polytetrafluoroethylene has a melting point, the polytetrafluoroethylene ***does not*** exhibit a fluidity to such a degree that it can be molded and thus is cannot be asserted as being a "thermoplastic resin."

Moreover, the *Iwanami Physical and Chemical Dictionary* actually describes "fluorocarbon polymer" as something that "does not exhibit a thermoplasticity." Further, the web page (http://www.hkpgmbh.de/daikin/daikin/products/ptfe/ptfe.html) of Daikin Chemical Europe GmbH teaches "PTFE does not flow above its melting point."

Accordingly, the membrane (70 and 390) described in Kaplan cannot be asserted as being the barrier film recited in the claimed invention.

Furthermore, the air battery described in Kaplan employs a metallic anode can and a metallic cathode can[9] and does not in any way employ a battery container formed of a laminate film.

The outstanding Action states on page 10 that "Kaplan as modified by Okazaki, Porter et al., Espig et al., Abraham et al. and Norio necessarily possesses the internal pressure in the battery container kept lower than atmospheric pressure by 0.1 to 80 kPa during continuous discharge," however, Applicants respectfully submit that this assertion is erroneous.

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[7] See descriptions of "thermoplastic resin" in *Iwanami Physical and Chemical Dictionary*.
[8] See *Iwanami Physical and Chemical Dictionary*
[9] See column 2, lines 60-63, column 4, lines 41-49 and FIGS. 1 and 2 of Kaplan.

Specifically, with regard to the assertion that "the ratio of the gap in the air battery container, the area between the cathode and anode cans...of Kaplan is within the range of 5 to 40%" on page 9 of the outstanding Action, Applicants respectfully submit that this conclusion is incorrect. This is the case because "the range of 5 to 40%" in the system of the combination of Kaplan, Okazaki, Porter, Espig, Abraham and Norio would not function properly. In contrast, when a battery container is formed of a laminate film as in the claimed invention, such a range is possible, as is clear from the description in the present disclosure.[10]

Therefore, the conclusion that the combination of cited references "necessarily possesses" the claimed internal pressure in the battery container during continuous discharge is incorrect.

Moreover, Applicants respectfully submit that the further cited Arayo, Rosato, Kelsey, Yoshino, Porter, Espig, Abraham, Norio, Tekuchi, Golvin, Hatakeyama, Hoyt, Okazaki and Tinker do not cure the above noted deficiencies of Kaplan and with respect to the claimed invention.

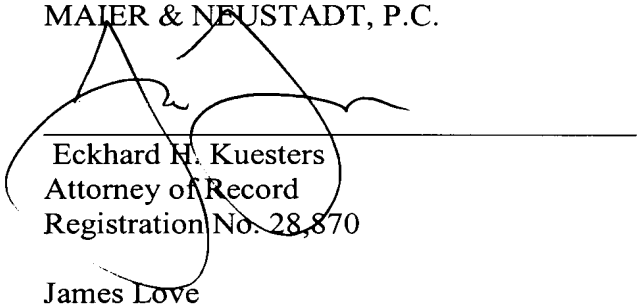
Accordingly, Applicants respectfully submit that Claim 1 and similarly Claim 15 patently distinguishes over Kaplan, Arayo, Rosato, Kelsey, Yoshino, Porter, Espig, Abraham, Norio, Tekuchi, Golvin, Hatakeyama, Hoyt, Okazaki and Tinker considered individually or in any combination.

[10] See page 32, lines 12-16 of the present disclosure.

Consequently, in view of the present amendment and in light of the above discussion, the outstanding grounds for rejection are believed to have been overcome. The application as amended herewith is believed to be in condition for formal allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



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Iwanami Physical and Chemical Dictionary

4th Edition

Edited by: Ryogo Kubota, Saburou Nagakura,

Hiroto Iguchi, Hiroshi Ezawa

Published by Iwanami Shoten

Page 950

[thermoplasticity] Property of material in which it becomes deformable when heated and reversibly cures when cooled. The property is observed in metals, glass, and synthetic resins (thermoplastic resins) of chain polymers. When the degree of increase in fluidity by heat is significant, the thermoplasticity is high.

[thermoplastic resin] A thermoplastic resin is a synthetic resin which exhibits, when heated, a thermoplasticity to such a degree that it can be molded. From the point of view of processability, the synthetic resins are mainly categorized into thermoplastic resin and thermosetting resin. It has a chemical structure of linear or branching polymers, and many resins such as polyethylene, polystyrene, polyvinyl chloride and polyamide belong to the category of thermoplastic resin. The thermoplastic resin occupies nearly 80% of the entire production amount of the synthetic resins. It has the advantage of being processable

efficiently by extrusion or injection. On the other hand, the heat resistance and solvent resistance thereof are low as compared to those of the thermosetting resin.

Page 1108

[fluorocarbon polymers] A general term for the synthetic resins obtained by polymerization of olefins containing fluorine. The type of the highest production is polytetrafluoroethylene $(CF_2CF_2)_n$, which is well-known by the product name Teflon. It has a very strong durability against chemical agents and an excellent electrical property. It is stable even at a high temperature. It does not exhibit a thermoplasticity, and can be molded by pressure forming burning or extrusion. It is used as gaskets, rod-like or pipe-like processed goods, insulating materials, lining materials. The surface has a small frictional coefficient and is hard to stick; it is used as a mold release agent. Polychlorotrifluoroethylene is slightly poor in properties but easy to process, and therefore it is applied to similar usages as processed by press, extrusion or injection. It should be noted that polyvinylidene fluoride or the like is used for audio equipments and the like as piezoelectric materials. Further, fluorine-containing polymers and co-polymers can be processed into a rubber-like material, which is called fluororubber, and they are applicable to wide usages as well.

Iwanami Physical and Chemical Dictionary 4th Edition,
copyright Iwanami Books, 1987
First publication of First Edition Published on April 15, 1935
First publication of Second Edition Published on November 10, 1953
First publication of Third Edition Published on May 20, 1971
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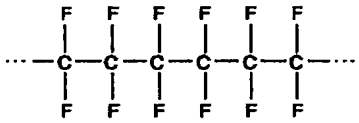

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